ISSN: 2053-3578 I.F. 12.34

ECONOMIC-MATHEMATICAL MODELS

B.B. Qarshiyev
Karshi State Technical University

Abstract: This article describes the history of the creation of economic-mathematical models, the conditions for the analysis of specific economic processes using economic-mathematical methods, as well as the structure of the mathematical model of some economicissues.

Key words: Model, modeling, matter, linear programming, optimal solution.

As is known, in recent years, issues of innovative economy, digital economy, economic analysis and auditing, and financing have become one of the most pressing problems. The role of economic and mathematical science in solving such problems is significant.

The concept of a numerical model was first developed in the field of national economy in the 18th century by the French scientist F. Quess. It went down in history under the name “Economic Table”. Based on this table, the author managed to generalize an infinite number of individual facts of production, exchange and distribution of products from the point of view of the national economy.

One of the remarkable pages in the development of economic and mathematical research is associated with the name of Academician L.V. Kantorovich, who became the founder of linear programming, which is widely used in solving economic problems. In this area, economists-mathematicians V.S. Nemchinov, F.L. Hitchcocks, V.V. Navozhilov, N.P. Fedorenko, G. Aganbegyan, and scientists of our Republic, led by Academician V.K. Kobulov, made a great contribution to the development of this discipline.

Today, a number of practical economic issues are solved with the help of mathematics. Economic practice has given rise to new branches of mathematics - system programming, game theory, public service theory, etc. On the basis of mathematics, balanced, network and other special methods of examining economic processes have been developed.

Modeling plays a very important role in human activity. In general, modeling and modeling are very broad concepts. For example, any knowledge itself is modeling, because in this case a given object is reflected in an ideal form using the nerve fibers of the brain, that is, we work with a model of the object.

ISSN: 2053-3578 I.F. 12.34

Models can be in the form of graphs, pictures, formulas, layouts, various mechanical, electrical and other devices.

When analyzing an economic process using economic and mathematical methods, the following five stages are conditionally considered:

1.) Formulation of the problem;

2.) Development of a mathematical model of the problem and, based on it, finding the desired solution;

3.) Verification of the model's closeness to reality, as well as the quality of the solution obtained;

4.) Correction of the model and solution if they do not sufficiently correspond to reality;

5.) Implementation of the solution obtained.

The first stage is the most responsible stage. Because the result obtained largely depends on the correct formulation of the problem, the researcher's deep understanding of the essence of the process and the ability to distinguish its characteristic features.

When creating an economic-mathematical model, linear programming, dynamic programming, integer programming, nonlinear programming, probabilistic models, and other programming systems are often used. In particular, linear models, that is, the linear programming model, are very widespread. The main difference between a linear programming problem and other problems is that the relationships between the quantities under consideration are expressed linearly.

The main characteristics of linear programming problems are a linear objective function, linear conditions imposed on the resources used - variable quantities.

Let's consider one of the linear programming problems:

The question of using raw materials:

Let an enterprise use three types of raw materials, namely x_1, x_2, x_3, for the production of two types of products, namely M_1 and M_2. Stocks of raw materials, the amount of raw materials used to produce a unit of product, and the numerical value of profit from each product unit should be as shown in Table 1.

Table 1.

Raw material types	Stock of raw materials	The amount of a unit of raw materials used to prepare a unit of product	
		M_1	M_2

ISSN: 2053-3578 I.F. 12.34

x_1	20	2	5
x_2	40	8	5
x_3	30	5	6
From one unit of product profit		50	40

If we define the quantity of M_1 unit of product as x_1, M_2 and the quantity of x_2 units of product as, and take into account the unit of raw material consumed to produce a unit of product and the supply of raw materials, we obtain the following constraint inequalities.

$$\begin{cases} 2x_1 + 5x_2 \le 20 \\ 8x_1 + 5x_2 \le 40 \\ 5x_1 + 6x_2 \le 30 \end{cases} \qquad (1)$$

These inequalities show that raw materials used for the production of products do not exceed the given stock of raw materials. If M_1 type of product is not produced $x_1 = 0$, otherwise $x_1 \ge 0$. The same is true for M_2 types of products.

So, there is always $x_1 \ge 0$, $x_2 \ge 0$, . Since one unit of product of type M_1 yields 50 units of profit, the total profit from this product is $50 \cdot x_1$. Similarly, the profit from the second product is $40 \cdot x_2$. The total profit is as follows

$$z = Z(x_1, x_2) = 50x_1 + 40x_2 \qquad (2)$$

and represents the objective function of the problem. Since the constraint conditions (1) and the objective function (2) are linear, expressions (2)-(1) form a mathematical model of a linear economic problem, that is, the problem of raw material utilization. Thus, to solve the problem (1), we find a non-negative solution $(x_1^{(0)}, x_2^{(0)})$ of the system such that the linear function determined by formula (2) reaches its maximum value (maximizes z), that is, the total profit is the largest.

It is worth saying that the solution obtained with the help of the economic-mathematical model is not always quickly used in practice. It is implemented only after a decision has been made as a result of a deep analysis, checking whether it corresponds to the real reality.

Literature:

1. Э.Абуталиев, С.Алимуҳамедов, А.Аъзамов, К.Бекбоев “Инженерлик-иқтисодий ҳисоблашларда сонли усуллар” Тошкент“Ўқитувчи” 1982.

2.Қ.Сафаева, Н.Бекназарова “Операцияларни текширишнинг математик усуллари” 2- қисм, Тошкент “Ўқитувчи” 1990.

3. . B.B.Qarshiyev., Z.Absamatov, Педагогическая деятельность как явление социалъно – педагогической. Научно-методический журнал Проблемы педагогики № 2 (47),2020 С. 100-103.

5. B.B.Qarshiyev., Z.Absamatov, Формиравание и совершенствование педагогических навыков в процессе обучения. Научно-методический журнал Вестник науки и образавания 2020. № 6. (84) Часть 1 С 79-84

6. Farhod Halimjonovich Haydarov, Shamshod Akhtamaliyev, Madalixon Nazirov, Behzod Boyxonovich Qarshiyev,Uniqueness of Gibbs measures for an Ising model with continuous spin values on a Cayley tree. Reports on Mathematical Physics.Volume 86, Issue 3, December 2020, Pages 293-302

7. X. Abdurasulov,K.N. Xolov ,B.B. Qarshiyev, Birinchi tartibli differensial tenglama yordamida elektron texnikaga oid masalalarni yechish. Oriental Renaissance: Innovative, educational, natural and social sciences. 390-398 bet